

Ocular Monitoring for Crew Health

Oxygenation Changes in the Eye Can Expose
Health Risks in Space Flight

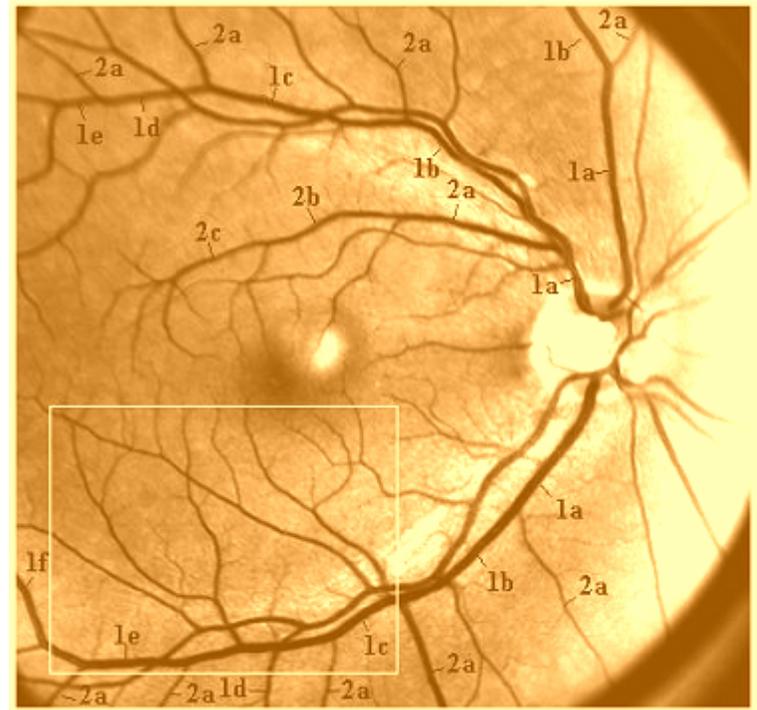
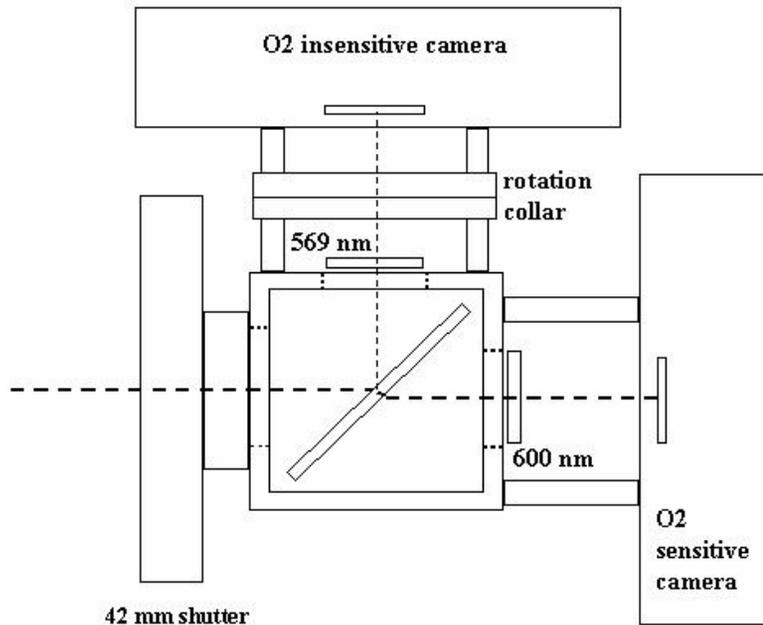
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Retinal Imaging

Current Work

- SBIR (NIH)
Retinal Oximeter for Clinical Assessments



Impaired Blood Flow Regulation and Microgravity

Multi-spectral retinal imaging oximetry directly images oxygen levels in the retinal vessels to evaluate oxygen delivery, consumption, and blood flow regulation.

These parameters are affected by fluid shift and altered metabolism, and thus could change in microgravity

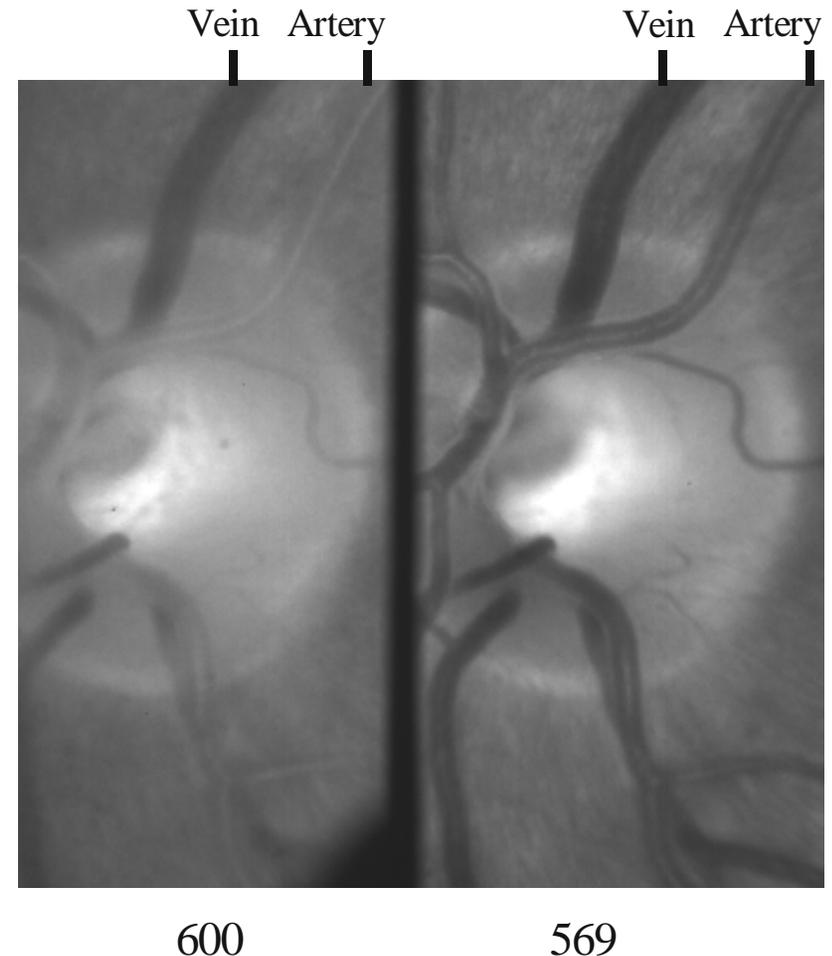


Figure 1: Dual-wavelength image of disk

Alignment with Space Flight

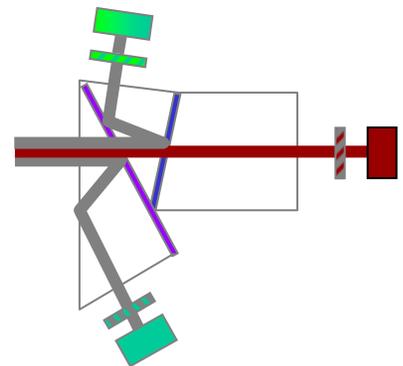
- Same technology should be applied to problems of long term space flight.
- Recognized problems include:

O₂ deprivation

impaired blood flow regulation

effects of microgravity on cardiovascular function

- Spectral imaging will give better understanding of these problems

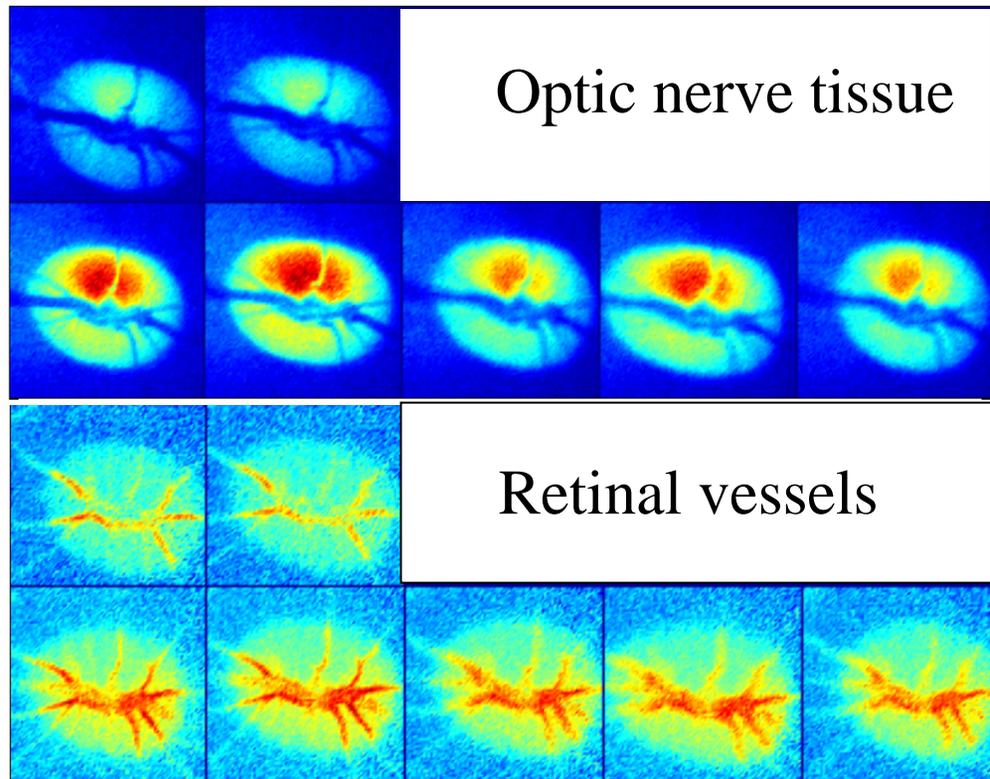


O₂ Enrichment Experiment

Retinal spectral imaging supports research for long duration space exploration

- Supplying answers for risk factors which impact crew health and performance
- Blood oxygen transport assessed by combination of retinal imaging, hemoglobin spectroscopy and pulse OX

Color-coded maps of O₂ improvement on optic disk tissue obtained with hyperspectral imaging.



Future Work

Miniaturized sensors - Combine present capabilities of multi- and hyperspectral imaging into a space ready sensor system for crew evaluations.

New algorithms - Further refine our ability to sense changes in supply and utilization of oxygen from retinal imagery. Includes improved accuracy and data management for display.